23. A friction material as set forth in claim 8, wherein the varying concentration of said plurality of heat conducting elements comprises a decrease in concentration of said plurality of heat conducting elements over a depth of about 0.05 inches to about 0.10 inches.

Additionally, in accordance with 37 CFR 1.121(c)(1)(ii), all amended claims are set forth in marked up versions in the pages attached to this Amendment.

REMARKS

After carefully reviewing the Final Rejection mailed January 28, 2002, a Request for Continued Examination has been filed along with this Preliminary Amendment and a Supplemental Information Disclosure Statement. Claims 1, 11, and 13 have been amended to more particularly define the present invention, and claims 21-23 have been newly added. Reconsideration of the application, as amended, is requested.

The Examiner indicated that the restriction requirement imposed was deemed proper and made final.

The Examiner rejected claims 1-15 and 20 under 35 U.S.C. §103(a) as being unpatentable over the Shibata et al. patent (U.S. Patent No. 5,004,497) in view of Nishimoto et al. (U.S. Patent No. 4,784,893). The Examiner says that the Shibata et al. patent discloses a friction material with improved wear resistance and thermal conductivity. The Examiner believes that this patent discloses a functionally graded material with a plurality of heat conducting elements situated therein. The Examiner acknowledges that the Shibata patent fails to disclose that the heat conducting elements are positioned in a predetermined arrangement or in a varying concentration. The Examiner then looks to the Nishimoto patent as providing these missing features and contending that it would have been obvious to one of ordinary skill in the art to have combined Shibata with the teachings of Nishimoto.

The Applicant respectfully traverses this rejection and submits that a careful review of these patents would not lead anyone of ordinary skill in this art to make the proposed combination.

The Shibata et al. patent does relate to a friction material which contains aramid fibers and carbon fibers. In column 3, lines 63-68, this patent does state that carbon fibers have high thermal conductivity and can be used to prevent vapor lock. If the Examiner reads on, in column 4, lines 5-10, this patent specifically teaches of providing for an even distribution of carbon fibers with preferentially para-aramid fibers. Kindly note in particular lines 5-6 in that column. In column 4, lines 20-22, the Shibata et al. patent describes how to ensure a sufficient reinforcing efficacy and even distribution of carbon fibers. This teaching is contrary to that of the instant invention which specifically recites a varying distribution of the heat conducting elements. The present invention is directed to a functionally graded material with a varying concentration of the heat conducting elements that decreases from the first friction surface to the second non-engaging surface. Thus, the Applicant respectfully submits that the Shibata et al. patent teaches away from that of the instant invention.

The Nishimoto et al. patent relates to a heat conductive circuit board. This patent does not relate to friction material and one of ordinary skill in this art would not even consider a circuit board as being analogous to friction material due to dimensional and functional considerations. The function and use of circuit boards are so different from that of friction materials, that no one of skill in this art would even look to the Examiner's proposed combination. There is nothing in the Nishimoto et al. patent or in the Shibata et al. patent which would suggest the Examiner's proposed combination. The Shibata et al. patent teaches away from such a combination. As stated previously, Shibata et al. specifically teaches of an even distribution of the thermally conducting carbon fibers within the friction material.

Additionally, the Nishimoto et al. patent in Fig. 3 depicts an arrangement for a circuit board that has semiconductor elements and resistor elements. In Fig. 3 of the Nishimoto et al. patent, there is shown a sectional view of the circuit board which includes a metal substrate 3 with an insulating layer 6, an organic polymer 2, alumina fibers 1, and an electrically conductive layer 4. In column 1, lines 36-50, this patent explains how ceramics have excellent electrical insulating properties and a high thermal conductivity. Additionally, in lines 44-46 of column

1, it explains: "it is preferable to disperse the ceramic within the organic polymer so that the ceramic particles are arranged continuously as far as possible".

The Examiner must consider the teachings of this patent as a whole rather than focusing on specific elements or teachings within the reference. If one of ordinary skill in the art were to combine the teachings of Fig. 3 with the friction material described in the Shibata et al. patent, that one still would not arrive at the instant invention. Instead, one would employ the features disclosed in Fig. 3 with that of the carbon and aramid fibers as taught in the Shibata et al. patent. There would still exist an even distribution of the heat conducting elements within the material.

Enclosed herewith is a Supplemental Information Disclosure Statement prompted by receipt of a foreign search report which recently came to the Applicant's attention. The Applicant respectfully submits that the claimed invention is patentable over these references.

In view of the above, the Applicant respectfully submits that all of the claims are in condition for allowance. Reconsideration of the rejections is requested. Allowance of the claims at an early date is solicited.

Respectfully submitted,

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MARKED UP VERSION OF ALL AMENDED CLAIMS

1. **(Twice Amended)** A friction material with improved wear resistance and thermal conductivity, comprising:

a functionally graded material including a composite material having heat and wear resistant fibers therein impregnated with a resin; and

a plurality of heat conducting elements situated within said functionally graded material in [an] a selected orientation and spatial distribution with a varying concentration, wherein said [heat conducting elements] functionally graded material is constructed for engagement with a cooperating movable member, said functionally graded material including a first friction surface constructed for such engagement and a second non-engaging surface, said varying concentration of said heat conducting elements decreasing in concentration from said first friction surface to said second non-engaging surface, said heat conducting elements transferring heat away from [a] the first friction surface of said functionally graded material to [a] the second non-engaging surface.

11. **(Twice Amended)** In a composite friction material having opposed surfaces with one surface engaging a movable, engageable part, the improvement comprising heat conducting elements disposed in said composite friction material in a selected arrangement and a varying concentration for transferring heat away from said engaging surface to a non-engaging surface said varying concentration of said heat conducting elements decreasing in concentration from said first friction surface to said second non-engaging surface, said heat conducting elements being woven with fibers forming the composite friction material.

13. (Amended) The friction material according to claim 12, wherein said plurality of metal components comprise members selected from the group consisting of filaments, threads, and wires[, powders, and particulate].